



Mars Exploration Program Discussions

F. Li

Jet Propulsion Laboratory, California Institute of Technology

10/20/17

Mars Exploration Program Science Goals



Life



Climate



Geology & Geophysics



Prepare for Human Exploration



Mars Exploration Program Missions

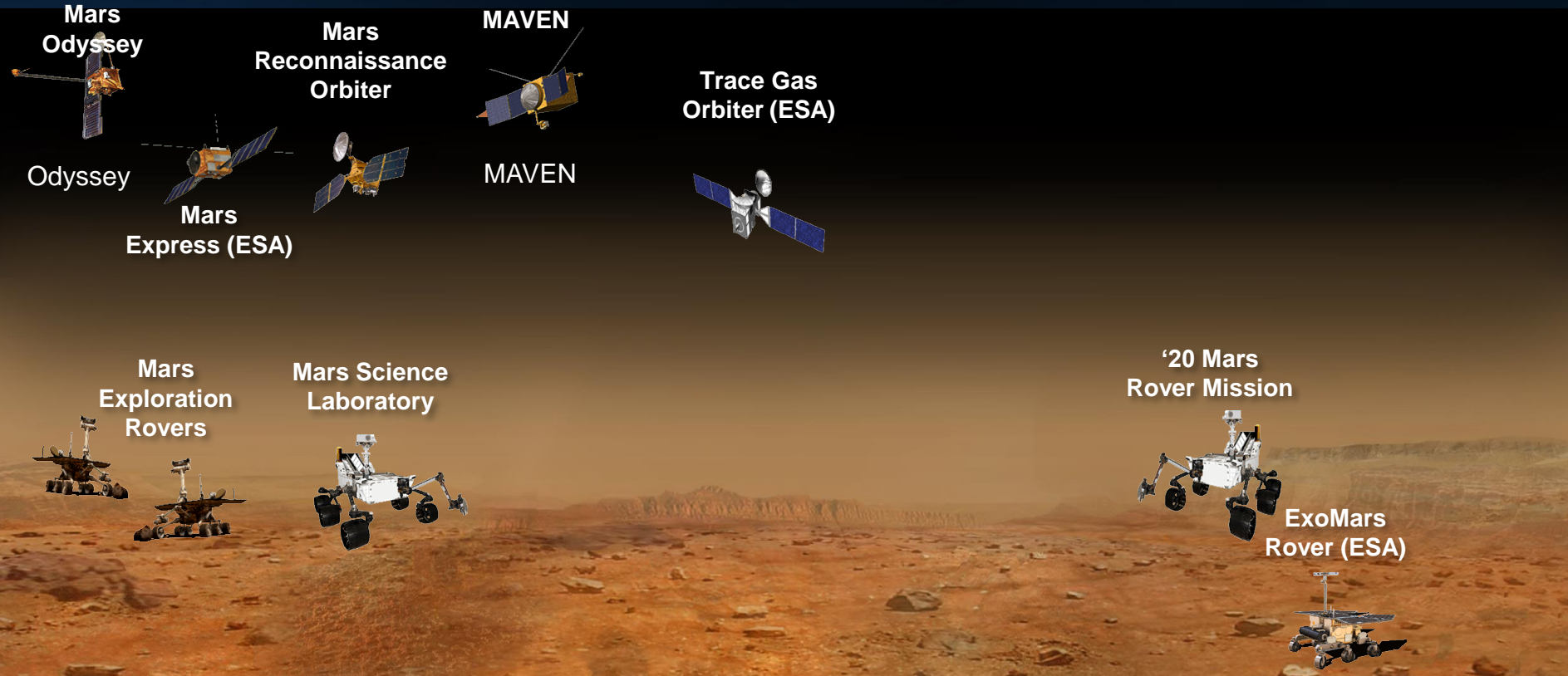
2001 - 2015

2016

2018

2020

Future Mars
Missions



Mars Exploration Program Highlights

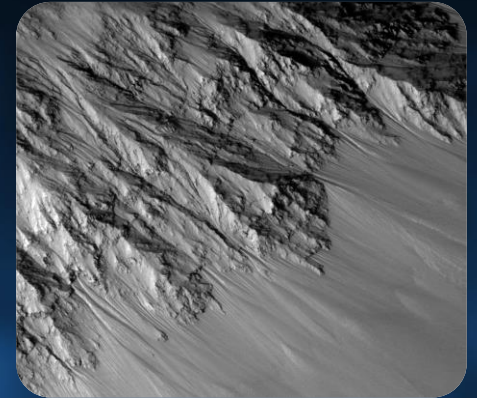
Opportunity: Journey to
Perseverance Valley



MRO: >50,000 orbits
Completed Global 6m
Resolution Imagery



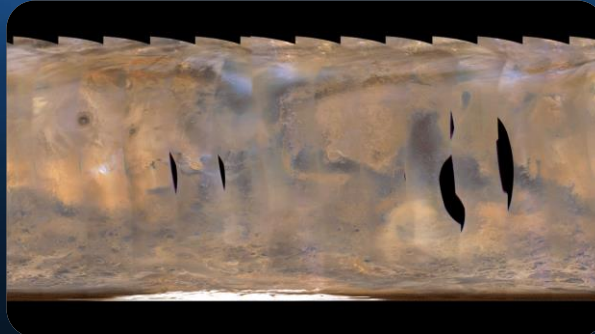
MRO: Continuing
Observations of Recurring
Slope Lineae



Curiosity: >5 years
since landing



MAVEN Tracks Back-to-back
Regional Storms



Mars 2020 Landing Site
Finalists



Mars 2020: Mission Overview



LAUNCH

- Atlas V 541 vehicle
- Launch Readiness Date: July 2020
- Launch window: July/August 2020

CRUISE/APPROACH

- ~7 month cruise
- Arrive Feb 2021

ENTRY, DESCENT & LANDING

- MSL EDL system (+ Range Trigger and Terrain Relative Navigation): guided entry and powered descent/Sky Crane
- 16 x 14 km landing ellipse (range trigger baselined)
- Access to landing sites $\pm 30^\circ$ latitude, ≤ -0.5 km elevation
- Curiosity-class Rover

SURFACE MISSION

- 20 km traverse distance capability
- Enhanced surface productivity
- Qualified to 1.5 Martian year lifetime
- Seeking signs of past life
- Returnable cache of samples
- Prepare for human exploration of Mars

Mars 2020 Mission Objectives

- A. Characterize the... geologic record... of an astrobiologically-relevant ancient environment.
- B. Perform... astrobiologically-relevant investigations.
- C. Assemble rigorously documented and returnable cache...
- D. Contribute to the preparation for human exploration of Mars...

The Mars 2020 mission fully responds to the high priority Planetary Decadal Survey recommendation for a Mars science rover to perform in situ science and collect and cache a set of scientifically documented martian samples for potential future return to Earth

Mars 2020 Rover Instruments

SUPERCAM

Examines rocks and soils with a camera, laser and spectrometers to seek organic compounds

MASTCAM-Z

Mast-mounted camera equipped with a zoom function

MEDA

Makes weather measurements, including wind speed and direction, temperature and humidity

SHERLOC

Fluorescence and Raman spectrometer and visible context imaging

RIMFAX
Ground-penetrating Radar

MOXIE
In-situ oxygen production

CACHING SYSTEM

Collects, packages, and deposits Mars samples for future missions to retrieve

PIXL

Comprised of an X-ray spectrometer to identify elements, and a camera to take close-up pictures of rock and soil textures

